

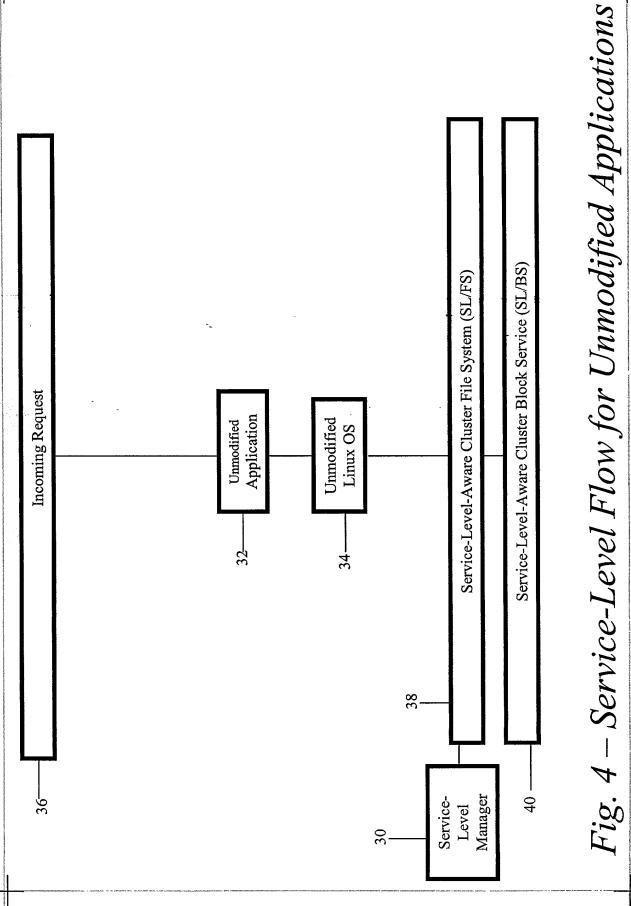
FIG. 1 – Data Network with Edge Server

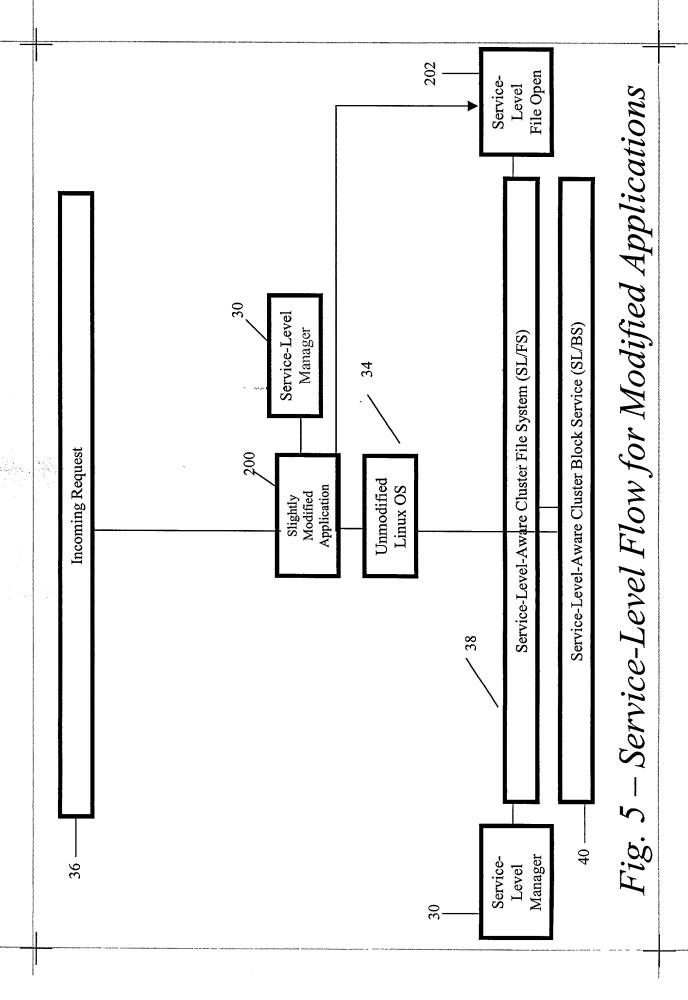
Appendix of the street of the

FIG. 2 – Service-Level Controlled Server

Server 6
Server 5
Server 4
Server 3
Server 2
Server 1

FIG 3 – Six Node Cluster





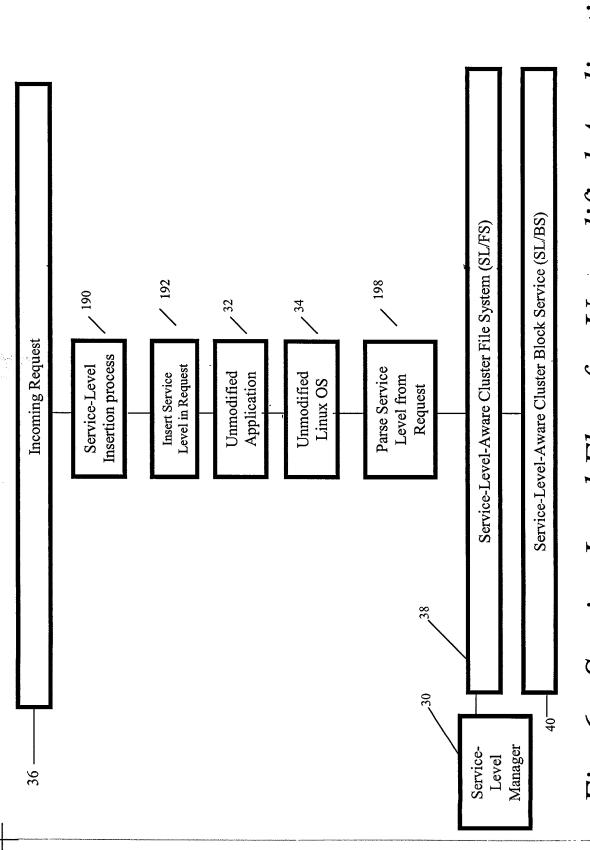
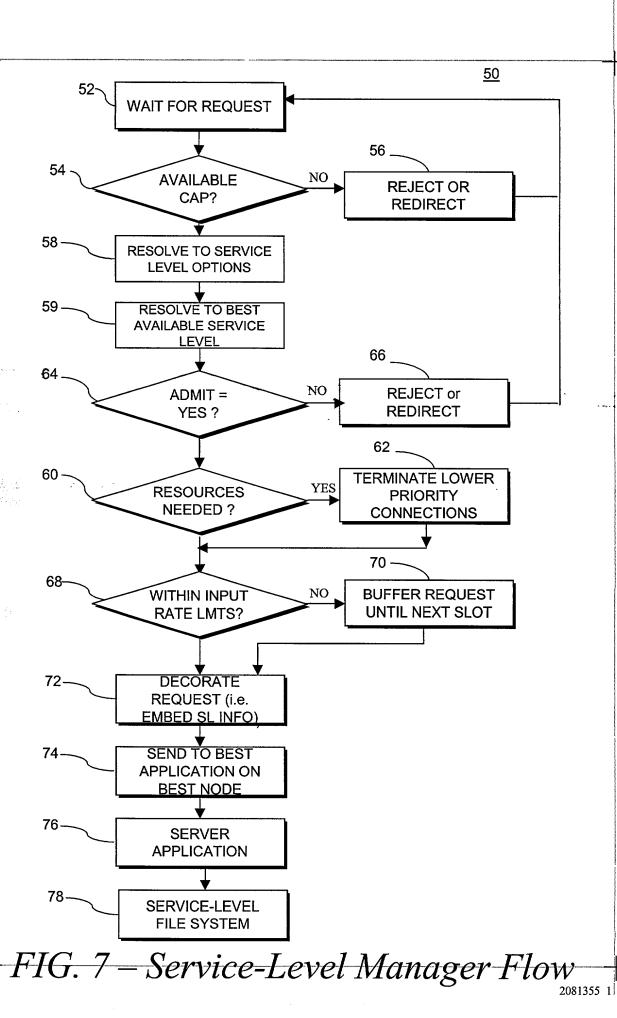


Fig. 6 – Service-Level Flow for Unmodified Applications



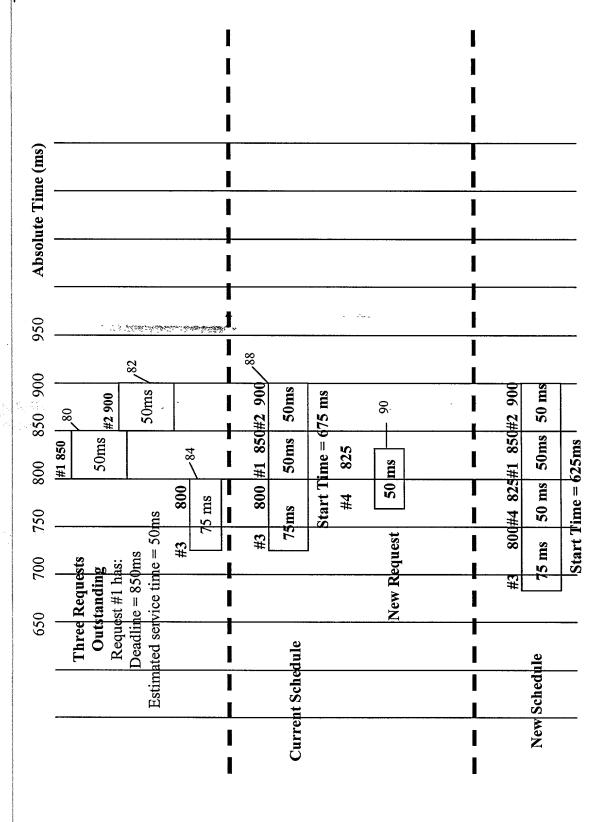


Fig. 8 - Managing a Disk Schedule with a Single Priority

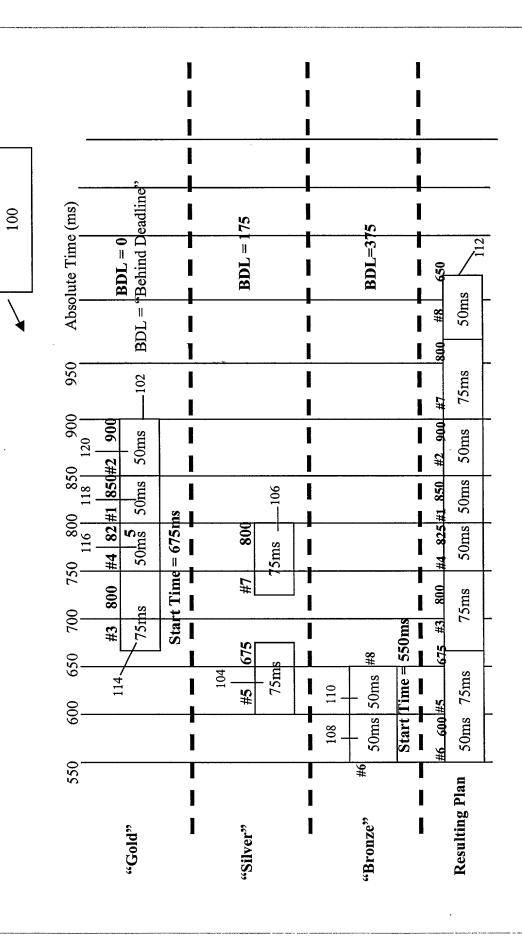


Fig. 9 - Managing a Disk Schedule with a Three Priorities

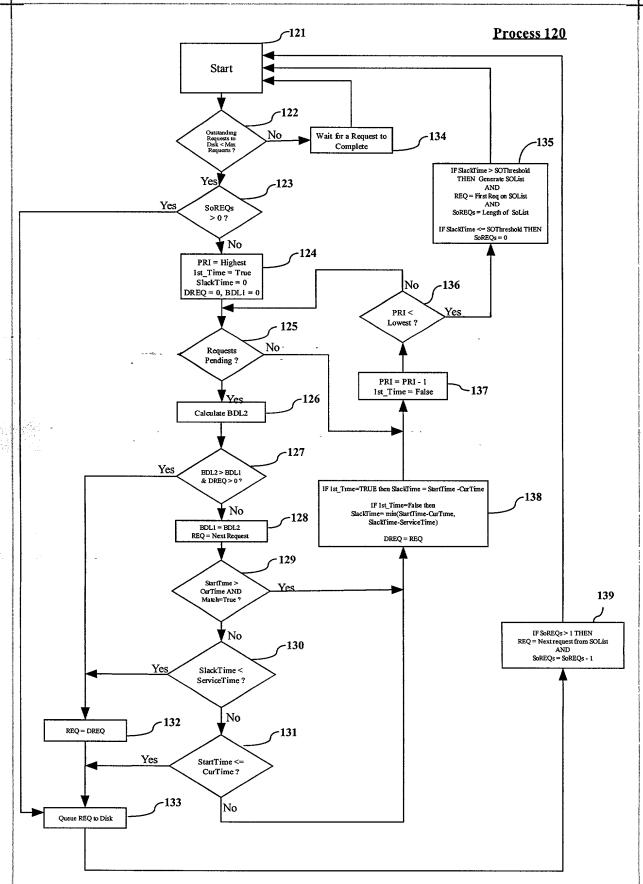


Fig. 10 – Service-Level Disk Scheduler

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FIG. 11 – Example of Service-Level Management Interface

DIRECTORY

/ CUSTOMER
/ VIDEO
/ AUDIO
movie.wmv
movie.mmv
song.wma
song.wma
song.wma
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/ STATIC file.html file.gif file.jpg FIG. 12 – Example of Directory Hierarchy for A Customer Account

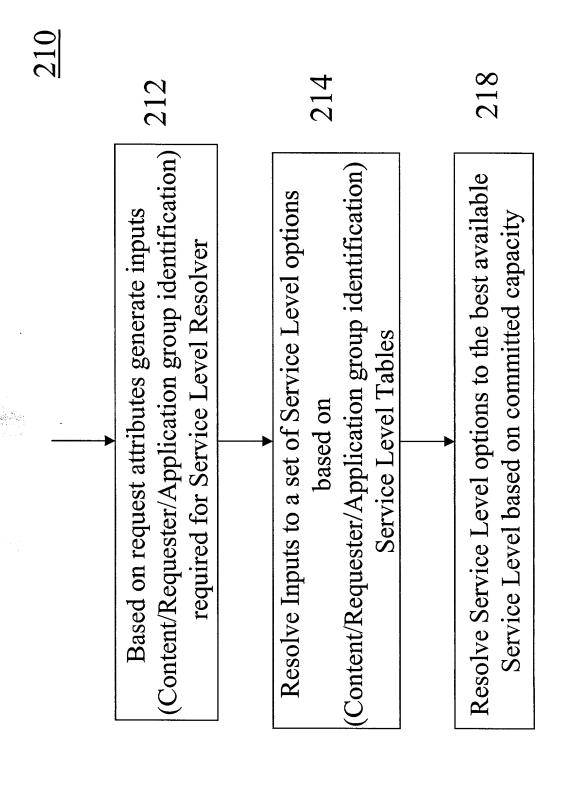


FIG. 13 – Process to Resolve Service Levels

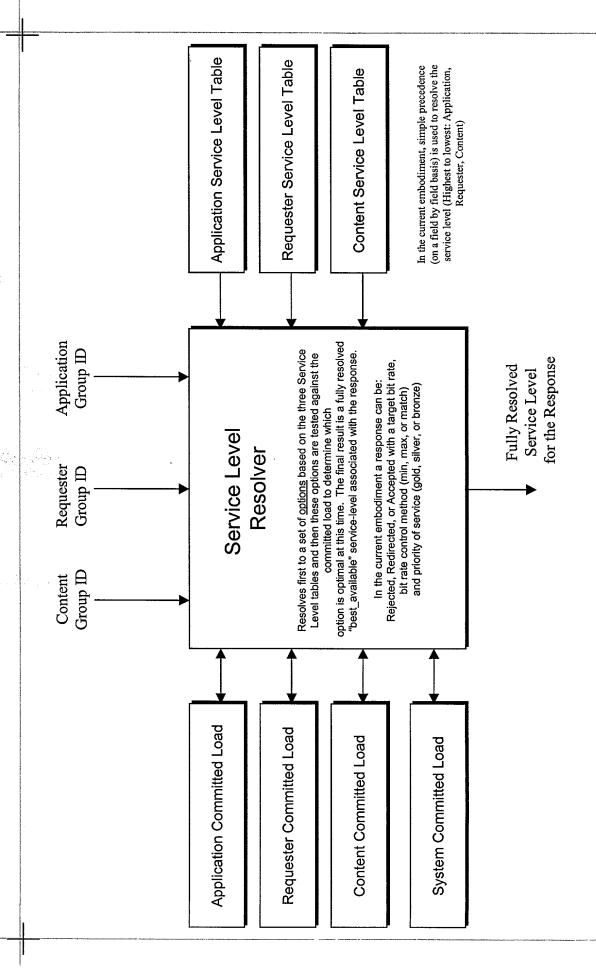


FIG. 14 - Service-Level Resolver

		Mariana (anterior anterior de la companio		***************************************		
URL for Redirection and Network QOS Settings	http://redirect1.	1	-	http://redirect2. com	1	-
On "No Admission "	Redirect	Reject	Reject	Redirect	Reject	Reject
Bit Rate Control	Min	Min	Max	Min	Min	Min
Individual Response Bit Rate (Kbps)	1.000	0.500	0.100	1.000	0.000	0.000
Aggregate Bandwidth (Mbps)	100	100	200	50	0	0
Priority	GOLD	SILVER	BRONZE	GOLD	SILVER	BRONZE
XGID	0001	0001	0001	0005	0002	0005

FIG. 15 - Service Level Table Structure

Priority Number (PN)	Service-level "Attribute"	"Color-based" Priority within
		a given Service-Level "Source"
10	Application	GOLD
6	Requester	GOLD
8	Content	GOLD
7	Application	SILVER
9	Requester	SILVER
5	Content	SILVER
4	Application	BRONZE
3	Requester	BRONZE
2	Content	BRONZE

In the current embodiment, I = lowest priority.

A given priority level in general is not oversubscribed, but may allocate the entire capacity of the system. The system is over-subscribed as a result of the aggregate capacity allocated by all priority levels.

FIG. 16 - Priority Assignment Example

Application GID	Priority	Aggregate BW	Response Bit Rate	Bit Rate Control	On "No Admission"
0001	ì	•	•	_	ı
0001	B	1	•	-	1

Requester GID	Priority	Aggregate BW	Response Bit Rate	Bit Rate Control	On "No Admission"
0001	1	•	1	-	1
0001	ı	•	-	-	•

On "No Admission" Redirect

Bit Rate Control
Min
Min

Response Bit Rate 1.000 0.500

Aggregate BW 100 50

Priority

Content GID

0004

In this example, the content-based service levels comprise the response options:

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There is more than IMbps spare capacity at Priority 8; therefore the response will be:

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In the current embodiment, -I in a field indicates no entry (marked '-' above)

FIG. 17 - Content-based SL Example

Application GID	Priority	Aggregate BW	Response Bit Rate	Bit Rate Control	On "No Admission"
0001	ı	1	•	•	t
0001	1		-	-	ı

0001 9 6 2.000 Min 0001 6 2 0.500 Min	Requester GID	Priority	Aggregate BW	Response Bit Rate	Bit Rate Control	On "No Admission"
0.500	0001	6	9	2.000	Min	Redirect
	0001	9	2	0.500	Min	Reject

Content GID	Priority	Aggregate BW	Response Bit Rate	Bit Rate Control	On "No Admission"
0004	1	•	-	•	ţ
0004	-	1	•	1	1

In this example, the request-based service levels comprise the response options:

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In this example, there is more than 2Mbps spare capacity at Priority 9; therefore the response will be:

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FIG. 18 - Requester-based SL Example

Application GID	Priority	Aggregate BW	Response Bit Rate	Bit Rate Control	On "No Admission"
0001	10	100	1.000	Min	Redirect
0001	7	50	0.500	Min	Reject

Requester GID	Priority	Aggregate BW	Response Bit Rate	Bit Rate Control	On "No Admission"
0001	ı	-	•	1	9
0001	3	1	ı	•	t

Content GID	Priority	Aggregate BW	Response Bit Rate	Bit Rate Control	On "No Admission"
0004	1	ŧ	1	1	1
0004	ı	•	•	1	1

In this example, the content-based service levels comprise the response options:

ity Bit Rate Control On "No Admission" 1.000	444 1 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4
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There is no capacity at priority 10 for this request but there is more than 0.5 Mbps spare capacity at Priority 7; therefore the response will be:

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FIG. 19 - Application-based SL Example

Lower Priority Application Service overrides Standard Content Service

Application GID	Priority	Aggregate BW	Response Bit Rate	Bit Rate Control	On "No Admission"
1000	4	52	•	•	-
0001	•	-	1	-	1

Requester GID	Priority	Aggregate BW	Response Bit Rate	Bit Rate Control	On "No Admission"
0001	•	1	•	•	-
0001	ŧ	-	1	-	-

On "No Admission"	Redirect	Reject
Bit Rate Control	Min	Min
Response Bit Rate	1.000	0.500
Aggregate BW	100	50
Priority	8	5
Content GID	0004	0004

In this example, the application-based service level defines the priority (it has precedence...).

Since the application-based priority is lower than the priorities of the other potential service levels, there will be only one option. The content-based service level for the priority closest to the app-based priority defines the rest of the option:

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FIG. 20 - Application+Content-based SL Example

Premium Requester Service overrides Standard Content Service

Application GID Priority Aggregate BW Response Bit Rate Bit Rate Control 0001 - - -			::: 1 2 221 121			
0001	Application GID	Priority	Aggregate BW	Response Bit Rate		On "No Admission"
- 1000	0001	E	1	•	1	1
	0001	1	•	ı	1	1

Requester GID	Priority	Aggregate BW	Response Bit Rate	Bit Rate Control	On "No Admission"
0001	6	1	•	1	t
0001		1	1	1	1
Content GID	Priority	Aggregate BW	Response Bit Rate	Bit Rate Control	On "No Admission"

The content-based service level for the priority closest to the app-based priority defines the rest of Option#1: In this example, the requester-based service level defines the priority of Option#1

www.redirect1.com

Reject to Redirect

Min

0.500

Aggregate BW 100 20

Priority

Content GID

0004 0004

Option 2 and 3 are taken directly from the Content Service Level entries.

**************************************			4
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On "No Admission"	Min Reject to www.redirect1.com	Min	MWWW.fedirect1.com
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There is I Mbps spare capacity at Priority 9; therefore the response will be:

Resolved Response		Kesponse-Bit-Kate Bit-Kate-Control Action	
•	(1 5 1	

FIG. 21 - Requester+Content-based SL Example

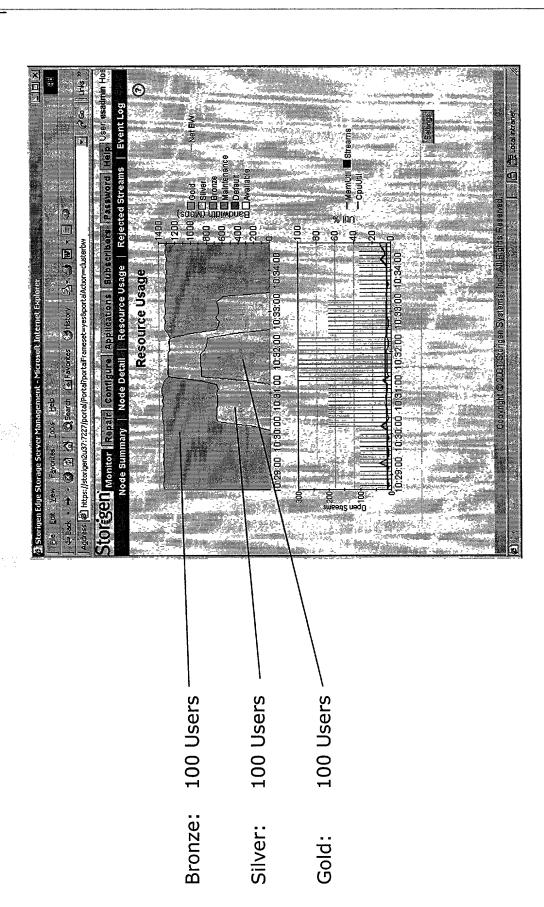


FIG. 22 – Mixed Service Level Workload